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CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 4 April 2002 with an application for Letters Patent number 518138 made by KYUNG TAE KIM and KYUNG HOON KIM.

Dated 14 May 2003.

PRIORITY DOCUMENT
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Neville Harris
Commissioner of Patents

NEW ZEALAND

PATENTS ACT, 1953

PROVISIONAL SPECIFICATION

"A Low Voltage Electricity Distribution Circuit"

We, KYUNG TAE KIM a citizen of the United States of America of 24971 Eaton Lane, Laguna Niquel, CA, USA and KYUNG HOON KIM a citizen of the United States of America of 8705 La Salle Street, Cypress, CA, USA, do declare this invention to be described in the following statement:

BACKGROUND TO THE INVENTION

Field of the Invention

The present invention relates generally to low voltage electricity distribution circuits. In particular, the present invention relates to a power busbar system that provides electricity to a receptacle that has both a continuously live power socket and a switched power socket, where the receptacle is relocatable along the busbar system.

Summary of the Prior Art

It is known in the art to provide a busbar power system having numerous power sockets. It is also known in the art to provide moveable power points along a busbar, in order to move appliances and the like to different locations along the busbar and thus to a different area of a room.

GB2344001 of Electrak International Limited discloses a modular multi-busbar power track system, where each module of the system has a plurality of linear busbars within an elongate casing. In each module there is at least one access socket into which a tap-off plug may be inserted to electrically connect other elements to the power track system. This system does not allow for the access sockets to be movable.

WO99/27618 of The Wiremold Company discloses a power track in which electrical receptacles are mounted on. The track has a busbar power system that serves to power the contacts of the electrical receptacles. Any number of electrical receptacles can be releasably secured to the track, at any point along the track, by twisting a receptacle onto the track. The electrical receptacle disclosed provides for continuously live power sockets but no means in which to switch the power sockets.

DISCLOSURE OF INVENTION

The object of the invention is to provide an apparatus which overcomes the abovementioned disadvantages or to at least provide the public with a useful choice.

Accordingly in a first aspect the present invention may broadly be said to consist in a low voltage electricity distribution circuit, which may supply both switched and unswitched power from switched and unswitched power sources, comprising:

a moulding defining an elongated recess,

a busbar system extending within said recess including a plurality of conductors, a first live conductor of which is connected in use to said unswitched power source and a second live conductor of which is connected in use to said switched power source, said conductors configured at intervals with receiving means capable of receiving the pins of a plug connected to a load or electrical appliance,

at least one receptacle that is mechanically and releasably engaged with said moulding, said receptacle having at least one live socket and one switched socket, each of said sockets being formed by a plurality of apertures extending through said receptacle, which in use are in registration with corresponding receiving means of said conductors,

wherein in use, when said plug is inserted in said live socket said pins form an electrical connection with said first live conductor and said electrical appliance or load is continuously powered, and when said plug is inserted in said switched socket said pins form an electrical connection with said second live conductor and said electrical appliance or load is switchably powered.

In a second aspect the present invention may broadly be said to consist in a low voltage electricity distribution circuit including a protected busbar system which in use is installed around the walls of a building or room, and which allow connections to be made between external electrical loads and the busbar conductors, said busbar system including a plurality of conductors, the improvement comprising:

a first live conductor of said plurality of conductors connected in use to a unswitched power source and a second live conductor of said plurality of conductors connected in use to a switched power source, said conductors configured at intervals with receiving means capable of receiving the pins of a plug connected to a load or electrical appliance,

at least one receptacle that is mechanically and releasably engaged with said busbar system or said walls, said receptacle having at least one live socket and one switched socket, each of said sockets being formed by a plurality of apertures extending through said receptacle, which in use are in registration with corresponding receiving means of said conductors,

wherein, in use, when said plug is inserted in said live socket said pins form an electrical connection with said first live conductor and said electrical appliance is continuously powered, and when said plug is inserted in said switched socket said pins form an electrical connection with said second live conductor and said electrical appliance is switchably powered.

Preferably said live socket and said switched socket are capable of each receiving a plug at coinciding times.

Preferably said elongated recess includes a channel for housing telecommunications lines and said receptacle includes a socket that receives a telecommunication line plug and connects said plug to said telecommunications line housed in said channel.

This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

BRIEF DESCRIPTION OF DRAWINGS

Preferred forms of the invention will be described with reference to the accompanying drawings in which;

Figure 1 is an illustration of the circuit of the present invention, where a receptacle having sockets is mounted to the power busbar system and busbar housing, and the sockets receive plugs connected to the electrical appliance or loads,

Figure 2 is a front view of the busbar of the circuit of the present invention, showing the busbar terminations,

Figure 3 is an alternative front view of the busbar of the circuit, in particular showing the configuration of the busbars and slots in which the pins of electrical plugs fit into,

Figure 4 is a side view of the busbar, busbar housing and receptacle of the present invention,

Figure 4A is a close-up view of detail A of Figure 4 showing the interconnection between the busbar housing, backplate and faceplate of the receptacle,

Figure 4B is an illustration of the installation or removal of the busbar cover of the present invention,

Figure 5 is an end view of the busbar insulator used with the circuit of the present invention in order to insulate the busbars,

Figure 5A is an isometric view of the busbar insulator,

Figure 5B is an isometric view of the busbar insulator with the busbars installed,

Figure 6 is an exploded view of the circuit of the present invention showing each component of the outlet and how each component interconnects,

Figure 7 is an illustration of the circuit of the present invention fully assembled,

Figure 7A is a close-up illustration of detail B of the circuit as shown in Figure 7,

Figure 8 is an illustration of an alternative busbar and receptacle suitable for the New Zealand power system,

Figure 9 is a plan view of the alternative busbar and receptacle as shown in Figure 8, and

Figure 10 is an illustration of two appliance plugs fitted into the busbars of the first form of the circuit of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The low voltage electricity distribution circuit of the present invention is a electrical outlet that includes a receptacle that is mounted to a busbar system. The busbar system is preferably mounted within a housing that extends horizontally along the base of a wall or other desired location. The receptacle has at least one continuously live power socket and at least one switched power socket disposed on it. Each of the power sockets is capable of receiving an appliance plug. The receptacle is movable along the busbar to a different location to allow for appliances, for example lamps or computers, to be located at many different points along the wall.

The preferred form of the electrical outlet apparatus of the present invention is shown in Figure 1. A busbar housing 2 is mounted on and extends along the base of a wall or at any other desired location on the wall. The housing 2 has a recess 3 extending within the entire length of the housing 2. Arranged within the recess 3 are a number of busbars 4, 5, 6, 8, 9. In the preferred form of the present invention, the busbars are made up of three electrically conductive contact strips 4, 5, 6 and two ground strips 8, 9 that extend along the recess 3. A busbar insulator 7 encloses busbars 4, 5, and 6. The busbar insulator 7 also provides channels to mount or locate the ground busbars 8 and 9. The busbar insulator is made from an insulative and fire retardant plastic type material, but other appropriate materials may be used. In the preferred form, the upper contact strip 4 is a continuously powered ("live") busbar, the centre contact strip 5 is a neutral busbar, and the lower contact strip 6 is a switched bus (one that can be made live by the operation of a switch). Disposed above and below the neutral busbar 5 are ground buses or strips 8, 9.

Fitted to the housing 2 and over the busbar is a receptacle. The receptacle is made up of a faceplate 10 and backplate 11. The backplate 11 is affixed to the housing 2, and a faceplate 10 is fitted over the backplate 11.

Referring to Figure 6, hollow protrusions 26 in the shapes of the electric appliance plug pins protrude from the base of the backplate 11. When the faceplate 10 is attached to the backplate 11, the protrusions 26 fit into complimentary shaped apertures 12, 13 in the faceplate 10, but do not extend out from the faceplate surface. When the faceplate 10 and backplate 11 are affixed to one another the apertures 12,13 and protrusions 26 form channels through the faceplate 10 and backplate 11. Sets of the channels form at least one socket that is capable of accommodating at least one standard two or three-pin electric appliance plug 15, 16. The channels extend to the busbars thereby allowing the pins of a plug, when inserted in a socket, to meeting with the busbars forming an electrical contact between the busbars and the plug pins.

Reference is now made to Figure 2 where, in particular, the busbar system 25 is shown in detail. As mentioned above the busbar system comprises two live buses, a neutral bus and two ground buses. The upper live bus 4 is connected through a current limiting device 18 to standard wiring that extends to a termination or fuse box within a

building, where the termination or fuse box is connected to an AC power source. The voltage of the live bus 4 in some forms will be 230V, but in others, such as when in use in a United States power system it may be 120V, or any other appropriate voltage. The current limiting device 18 may be a circuit breaker, surge protector, fuse, ground fault circuit interpreter or any other appropriate device. The centre bus (lying between the two live buses) is the neutral bus 5. The neutral bus is also connected to standard wiring and to the termination or fuse box of the building (the termination or fuse box ultimately being connected to an electrical power distribution system). The lower live bus is a switched bus 6 and is connected through a current limiting device 18 to wiring and then to one side of a switch 17. The switch 17 is a standard switch or dimmer switch that is disposed in a building wall in a known manner. The other side of the switch 17 is connected via standard wiring to the "live" terminal in the termination or fuse box. Finally, the ground buses 8 and 9 are connected to a ground terminal. This ground terminal is usually located within the termination or fuse box, but may be located elsewhere.

Referring now to Figures 3 and 10, each of the busbars 4, 5, and 6 is configured at intervals with receiving means. The receiving means are slots 14, which are integrally formed in each busbar. Each slot 14 is of a shape to receive a pin of a plug connected to a load or electrical appliance. The slots 14 are shaped to form a tight connection between the busbar and the pin of the plug. The slots 14 are spaced incrementally along the length of each of the buses in order to allow for incremental relocation of the backplate 11 and/or faceplate 10 along the busbar system. The slots 14 in the busbars are preferably formed integrally in the busbar by the incremental punching of the slots in the busbar, but the slots may be formed in other appropriate manners. In the preferred form, each slot 14 is formed when a central section 48 of the busbar is pushed downwards out of the plane of the busbar, thereby forming a trough, and the side sections 49, 50 of the busbar are pushed upwards out of the plane of the busbar, forming two upper inverted troughs on either side of the central section. In use, when a plug is inserted in the receptacle (frontplate 10 and backplate 11) and the pins from the plug extend through the receptacle into the slots 14 on the busbar, for each slot and respective pin, the central section 48 lies below the pin and the side

sections 49, 50 lie above the pin and a tight fit is formed about the pin, creating a electrical contact between the pin and busbar.

In some forms of the present invention, a plug may be utilised that has three pins. A standard electrical plug 15 is shown in Figure 1. In most forms such a plug has three pins, but in some forms may only have two pins. The first two pins 19, 21 are flat pins extending from the plug 15 along parallel axes. The third pin 20 can be circular in shape, or may be of similar shape to the first two pins, but usually the third pin 20 extends from the plug along an axis parallel but between the first two pins 19, 21.

Referring to the form of the three pin US type plug as shown in Figure 1, in use, when the plugs are inserted in a socket formed in the receptacle, the first pin 19 is connected the neutral bus 5 and second pin 21 may either be connected to the live busbar 4 or switched busbar 6. The third pin 20 is connected to one of the ground busbars 8, 9 by way of a ground slot 46. Incrementally spaced ground slots 46 are formed in the ground busbars. The ground slots 46 are similar to the slots 14 in the other busbars, but in this form of the present invention the shape of the ground slots 46 is circular so that the ground slots 46 are capable of receiving the third pin 20 of a standard US type plug. In other forms of the present invention the ground slots 46 and the slots 14 can be identical.

Referring again to Figure 6, the protrusions 26 in the backplate 11 and apertures 12, 13 in the faceplate 10 form at least two sockets, one being a switched socket and the other a live socket. However, more than two sockets can be formed on the faceplate 10, for example, in Figure 1, the faceplate has four sockets disposed within it, although in this form only two plugs are able to be received at one time within the sockets.

Figure 10 shows the busbars 4, 5, 6, 8, 9 and two plugs 15, 16. Plug 15 is in a position within the busbars which cause the appliance attached to the plug to be "switched". When a user operates the switch 17 (as shown schematically in Figure 2) the appliance can be switched on or off. When a plug is inserted in the "switched socket" the first pin 19 resides within a slot 14 in the neutral bus 5. The second pin 21 (not shown in Figure 10, but being disposed below pin 19) resides within an aperture

in the switched bus 6. The ground pin 20 resides within the slot 22 in the lower ground bus 9. Plug 16 is in a position within the busbars which cause the appliance attached to the plug to be continuously powered or live. When a plug is inserted in the "live socket" the first (upper) pin 23 resides within an aperture in the live bus 4. The second (lower) pin 24 resides within a slot 14 in the neutral bus 5 and the ground pin (not shown in this view) resides within a slot 22 in the upper ground bus 8.

The construction of the circuit of the present invention will now be described with reference to Figures 4 to 6. As already discussed, the busbar system 25 (consisting of the busbar insulator 7 and busbars 4, 5, 6, 8, and 9) resides within a housing 2 where the housing is located on a wall within a building. Figure 5 shows the end view of the busbar insulator 7. The busbar insulator has three hollow channels 43 to enclose the live, neutral, and switched buses. A continuous open slot 44 is incorporated at one side of these channels to allow the electric plug pins to extend through the apertures in the busbars. Figure 5A is an isometric view of the busbar 7 and shows the incrementally spaced openings 45 for the ground bus slots 22 (as described earlier with reference to Figure 3). As shown in Figure 6, the backplate 11 is attached to the upper 28 and lower 29 faces of the housing 2 by appropriate means. In the preferred form of the invention, the backplate 11 is indexed laterally by a boss (not shown) on the back of the backplate 11. This boss protrudes through incrementally spaced holes 46 (Figure 3) in the ground buses 8, 9 and then through the backplate locator hole 47 (Figure 5A). The backplate 11 is then screwed to the housing 2 using screws 27. Figure 5B shows the complete busbar system 25 with all buses installed in the busbar insulator. The remainder of the busbar and housing that is not covered by the backplate 11 is then covered by a cover 30 (Figures 6, 7) formed form a plastics type material and cut to the appropriate length.

In Figure 6 the faceplate 10 is illustrated as having a number of notches 32 that lock with complementary protrusions 31 formed in the backplate edges. When the faceplate is snapped over the backplate, the apertures 12, 13 of the faceplate 10 are aligned with the complimentary protrusions 26 of the backplate, so that when the plugs 15, 16 (see Figure 1) are inserted into these sockets, the pins extend through the

faceplate 10, backplate 11, open slots 41 of busbar insulator 7, and then into the slots within the busbars.

Figures 4, 4A and 4B show side views of the circuit. Figure 4A shows a protrusion 51 at the edges of the housing 2 locking with a corresponding protrusion 52 in cover 30. Figure 4B illustrates the installation and removal of the cover 30, which is achieved by squeezing and bending the cover 30 in order for the protrusion 52 on the cover 30 to fit into the protrusions 51 and into the housing, to cover the exposed parts of the busbar system. Other means to achieve the attaching the cover to the housing are envisaged, such as, sliding the cover over the housing.

When the receptacle (faceplate 10 and backplate 11) is completely installed as shown in Figures 7 and 7A, the gaps between the cover 30 and backplate 11 are covered by the ends of faceplate 10 thus providing for a safe and secure connection of the receptacle to the housing.

In order to move the faceplate 10 to a different position along the busbar the faceplate 10 must be removed (for example, snapped off using a standard flat blade screwdriver or similar tool) and the backplate 11 unscrewed and removed from the housing 2. The covers 30 then can be removed as described above referring to Figure 4B and the backplate relocated to a new desired location. The backplate is then resecured to the housing 2 using screws 27 and the replacement covers cut to appropriate lengths are reinstalled to cover the exposed busbar system and housing. Finally the faceplate 10 is reinstalled (snapped) onto the relocated backplate 11.

A number of backplates can permanently reside at appropriate locations along the busbar therefore faceplates can be installed over the backplates at a number of points along the busbar.

Figures 8 and 9 show an alternative form of the bus system of the present invention. This form is more appropriate for a power system within New Zealand. In this form the bus system 35 is arranged in a different manner so that the busbars and sockets 33, 34 are able to accommodate the New Zealand style plugs and pins. In this form the upper busbar 39 is the live busbar and the lower busbar 40 is the switched busbar. The centre busbar 36 is the neutral busbar and the busbars above and below the neutral busbar 36 are the ground buses 37, 38. In this form the slots in the live,

switched and neutral busbars 41 are of the same configuration as the slots 42 in the ground busbar, in order to accommodate the pins of a New Zealand style plug. This form of the electrical outlet of the present invention is constructed and operates in the same manner as is described above.

In other forms of the present invention a channel may be provided along the bottom of the housing 2 for the passage of telecommunications lines, such as a phone line or Internet line (CAT 5). The telecommunications line would preferably terminate at a socket formed in the faceplate, the socket would be of the type in which electronic equipment such as computers or telephones could be plugged into.

As already mentioned, the housing and busbars extend along the length of walls within a building. In order to facilitate the extension of the busbars around corners of the walls a number of clips are provided within the busbar system that accept the rectangular end of the busbars on one side and at the other side are attached to standard bendable wiring that extends around a corner and connects back into a second clip. The other side of the second clip is connected to a further rectangular end of the busbar and the length of the busbar extends along the length of a second wall. An alternate method of extending the continuity of the busbars around corners is to utilize standard solder joints with wires.

As the faceplate is positionable at any number of different locations along the busbar, the need for extension cords is minimised or eliminated. This provides a less cluttered room appearance and reduces the likelihood of tripping over or damaging extension cords. Furthermore, fire and other safety hazards are minimised. In comparison to a conventional electrical outlet embedded in a wall, it is very easy to change the location of the receptacle of the present invention and this can be accomplished with a minimum number of standard tools very quickly (time from start to finish should average less than 10 minutes). Also, the addition of new faceplates can be accomplished just as easily. Usually, changing the location of a conventional electrical outlet typically requires removing the drywall surrounding the outlet, removing the drywall surrounding the desired new location, securing the outlet to an internal beam or structure of the wall at the new location, extending the electrical

wires (within the wall) to which the outlet is connected, and applying new drywall or filler at the old and new locations of the outlet.

The faceplate and backplate, forming the receptacle, can be configured to receive any desired number of plugs for different electrical appliances (or electrical plugs). With redesign for different plug types, the basic concept of this apparatus can be adopted to any electrical system worldwide. Furthermore, the receptacle can be configured to receive different types of connectors, such as connectors for telephone wires, coaxial wires for cable television and/or cable modems, OSL wires, fibre optics, and the like (this would allow these connections to be relocated just as easily as the electric power outlets).

The receptacle of the present invention also provides a user with both a switched power socket and a continuously live power socket thus offering more versatility in placement of appliances and or lamps.

DATED THIS 4th DAY OF April 2002
AJ PARK
PER W Thelley
AGENTS FOR THE APPLICANT

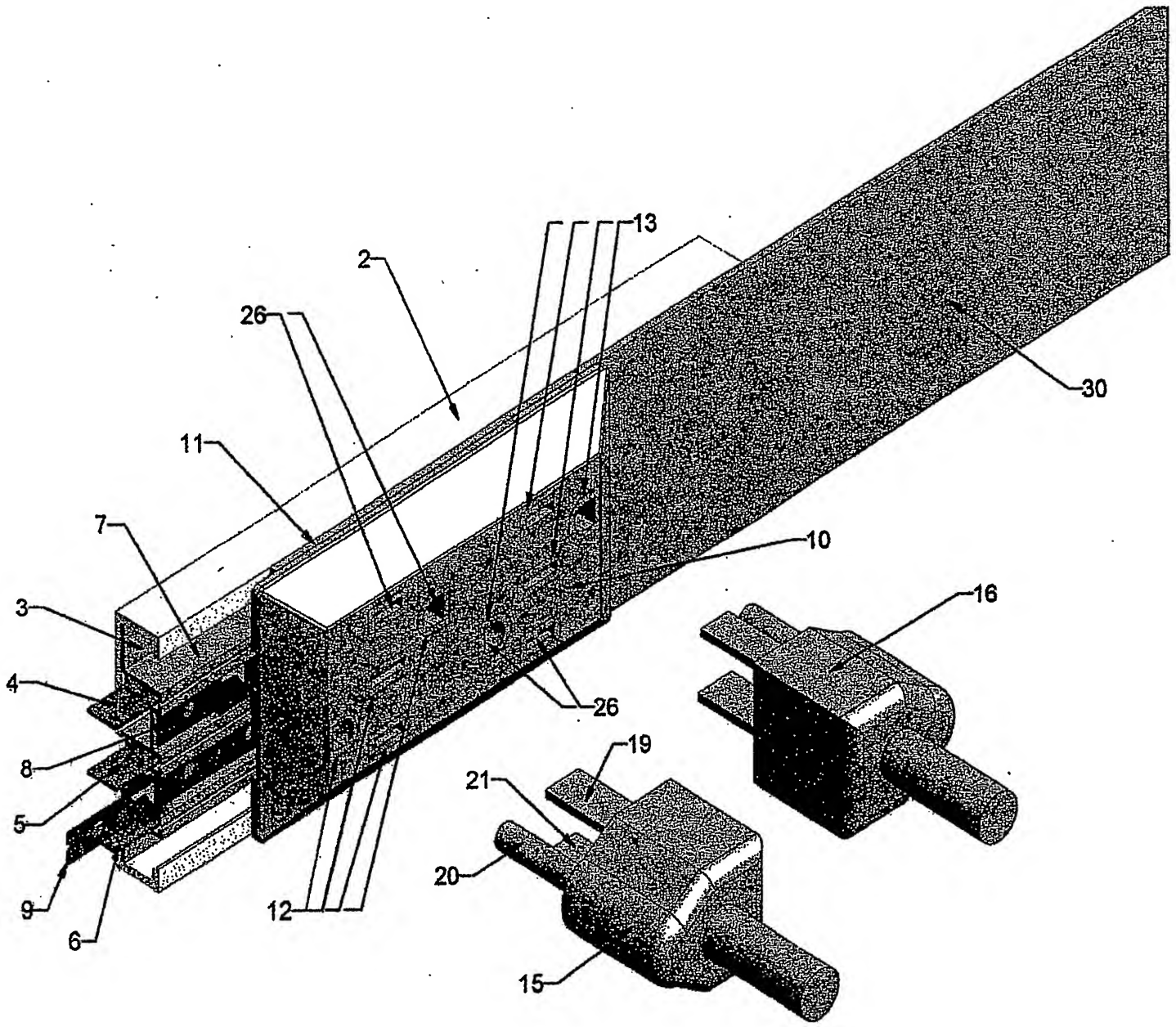

FIGURE 1

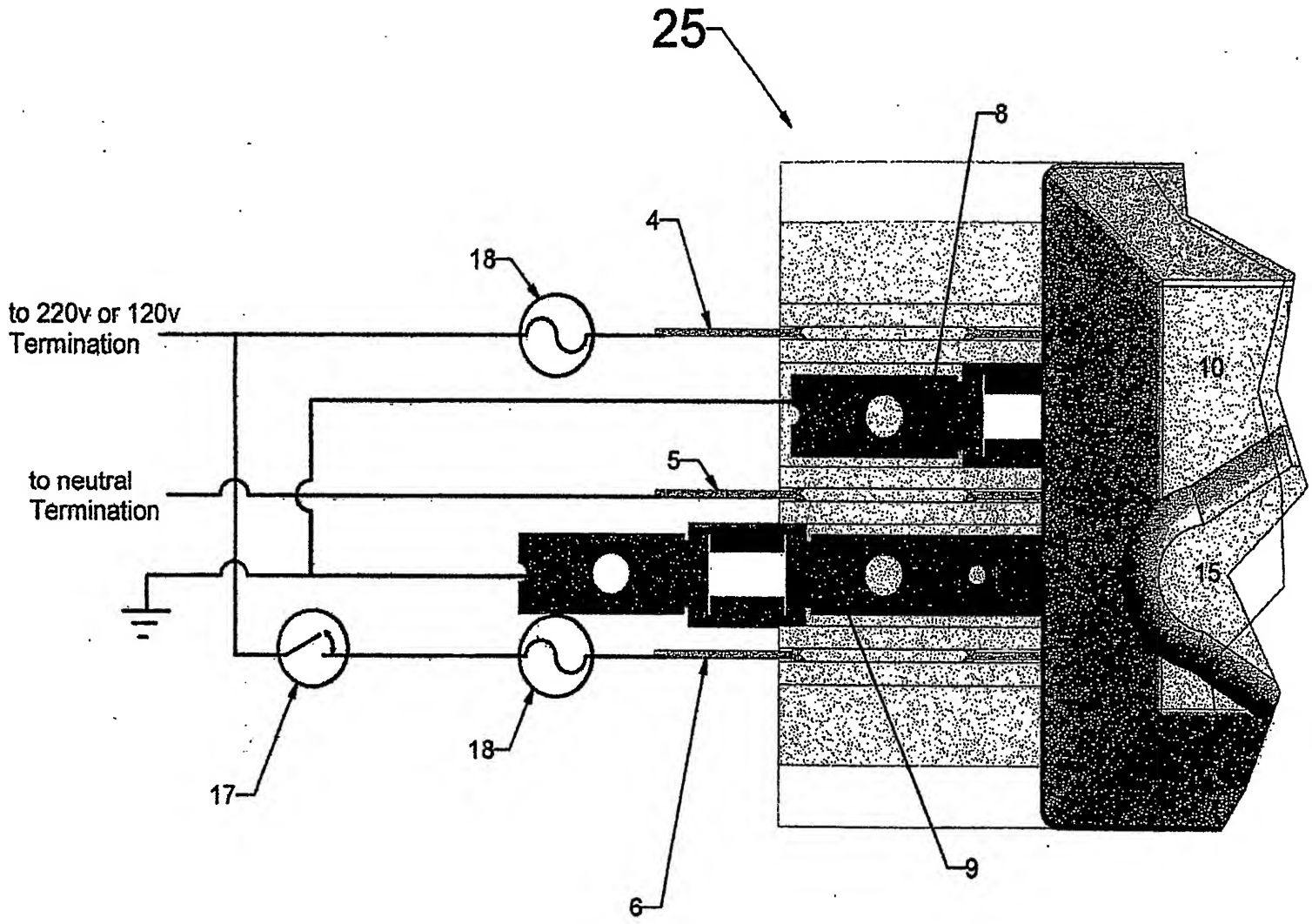
25
8
4
18
to 220v or 120v
Termination
10
5
to neutral
Termination
15
17
18
6
9

FIGURE 2

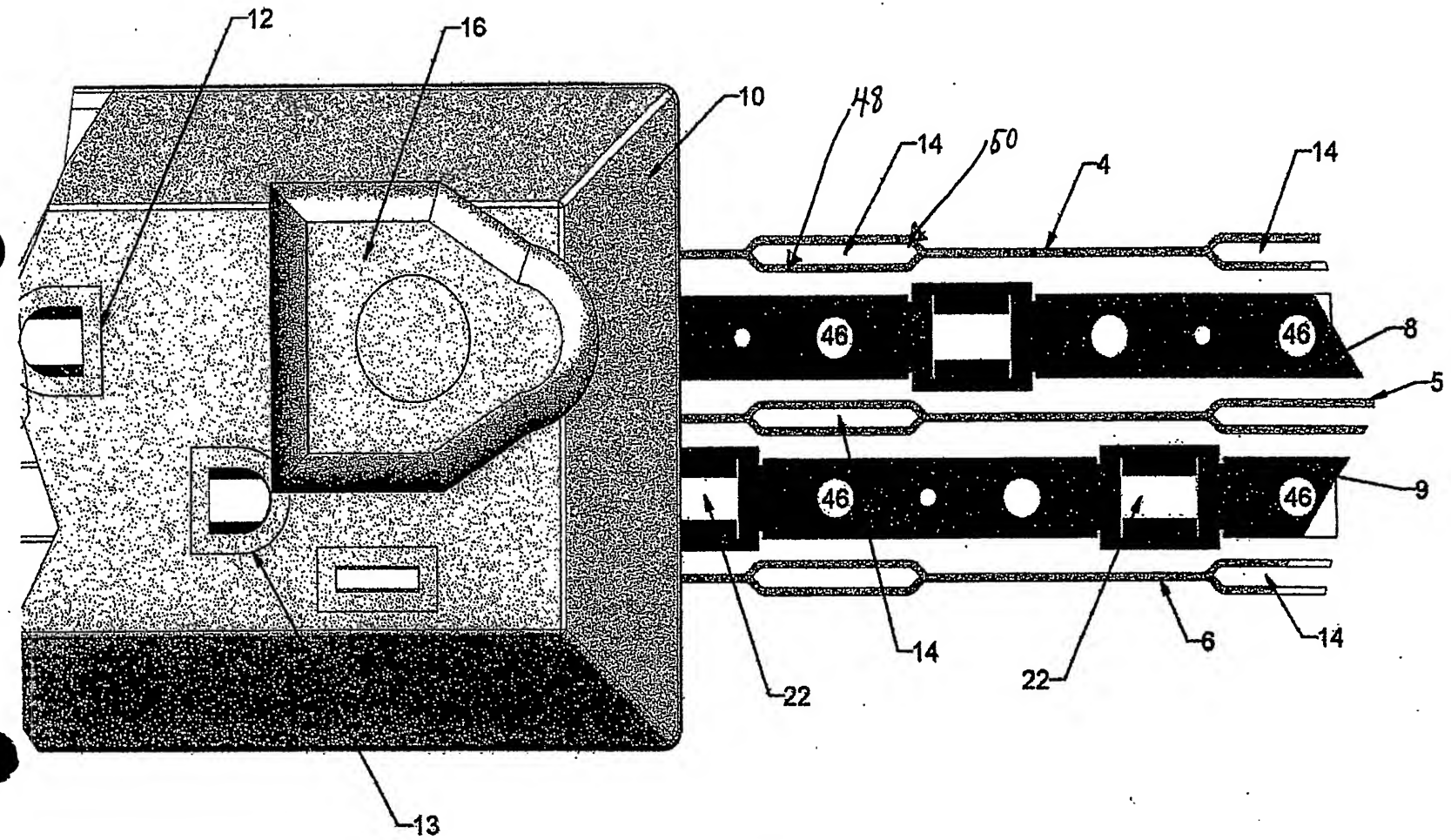

FIGURE 3

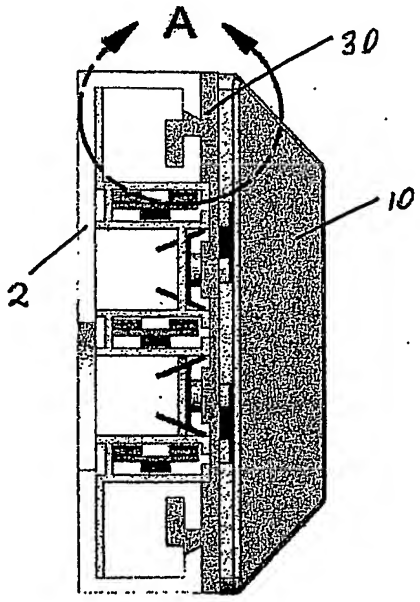

FIGURE 4

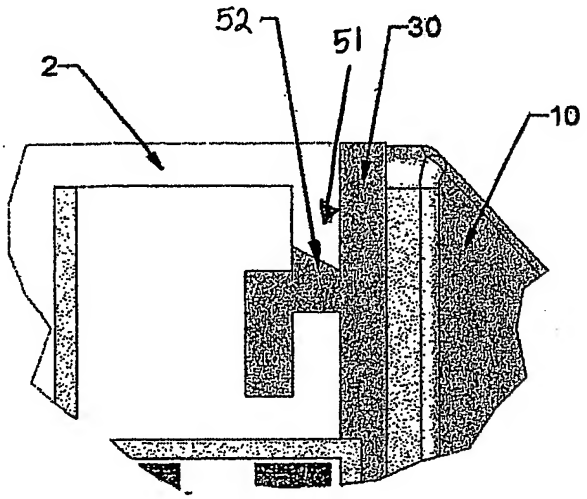

FIGURE 4A

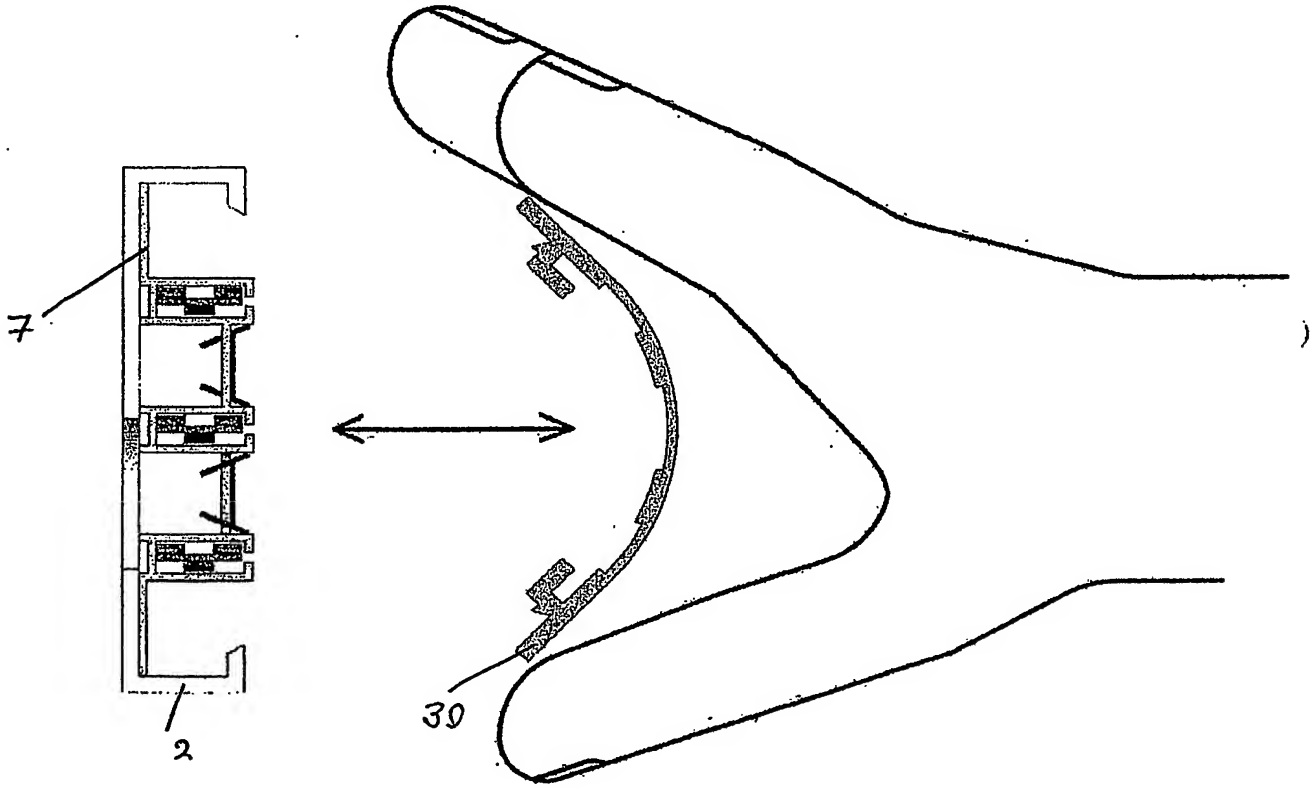

FIGURE 4B

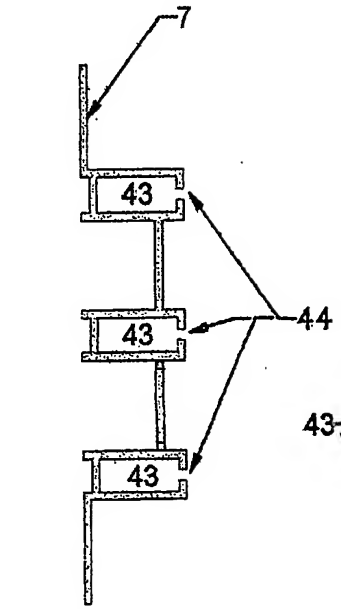

FIGURE 5

FIGURE 5A

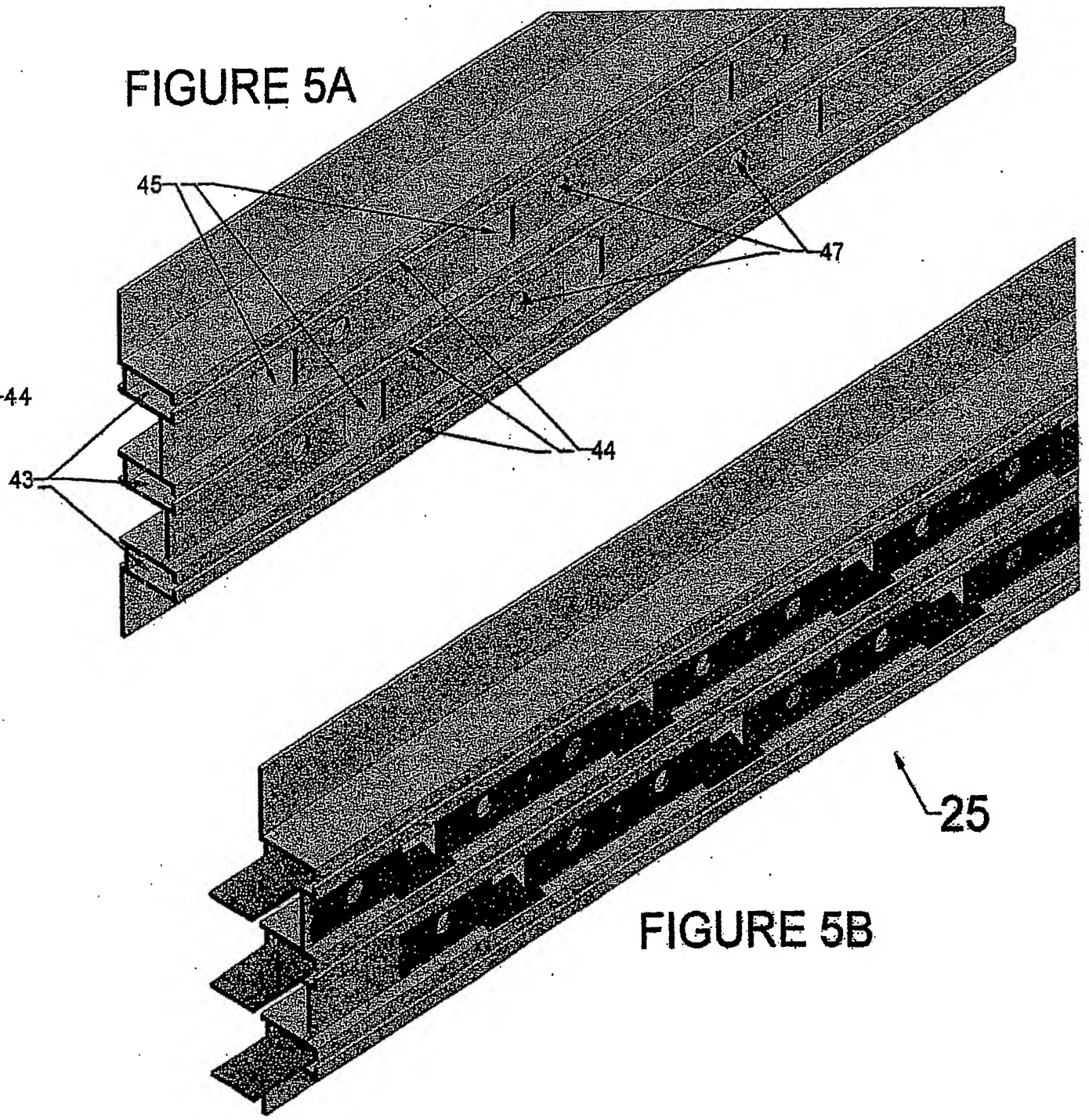

FIGURE 5B

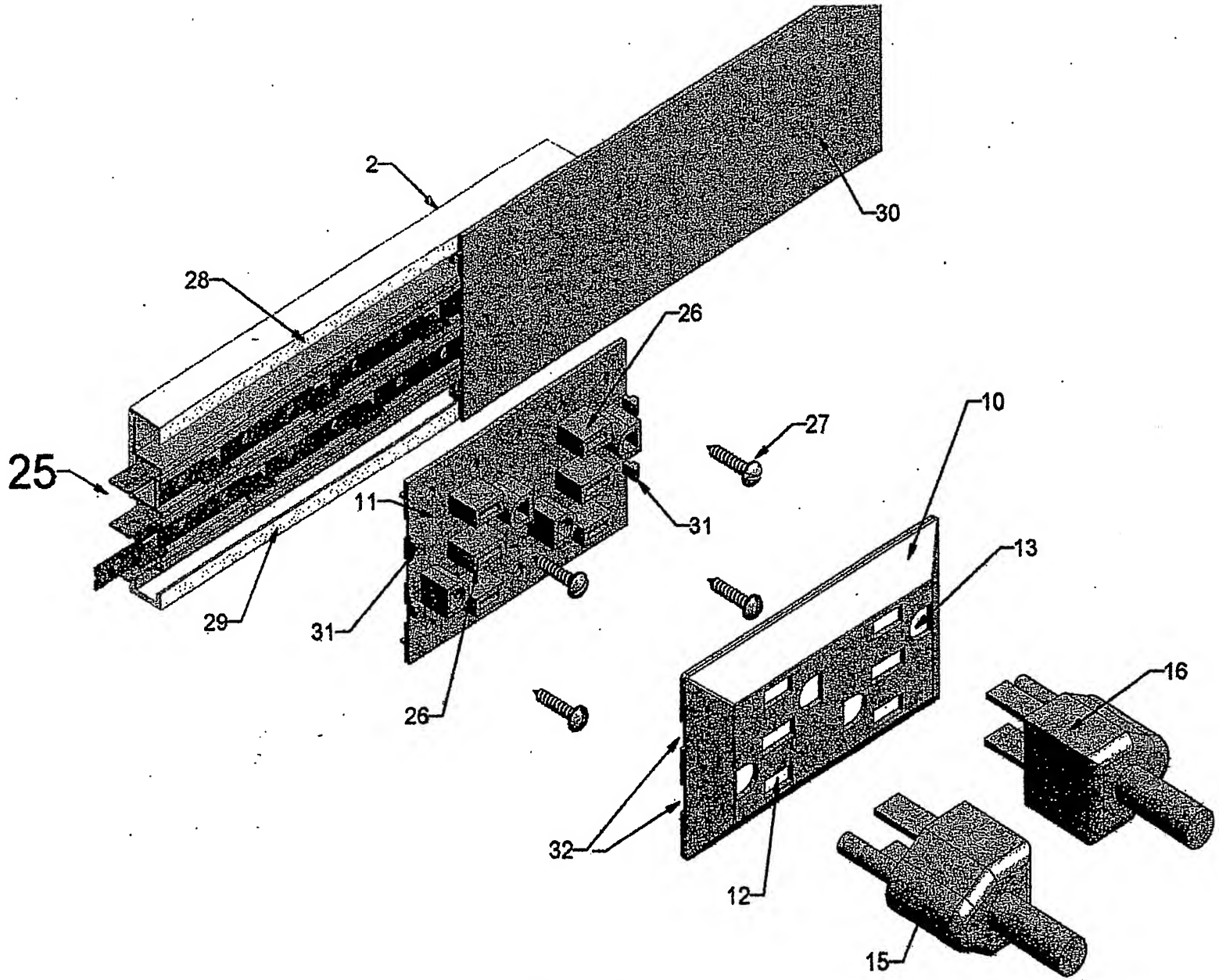

FIGURE 6

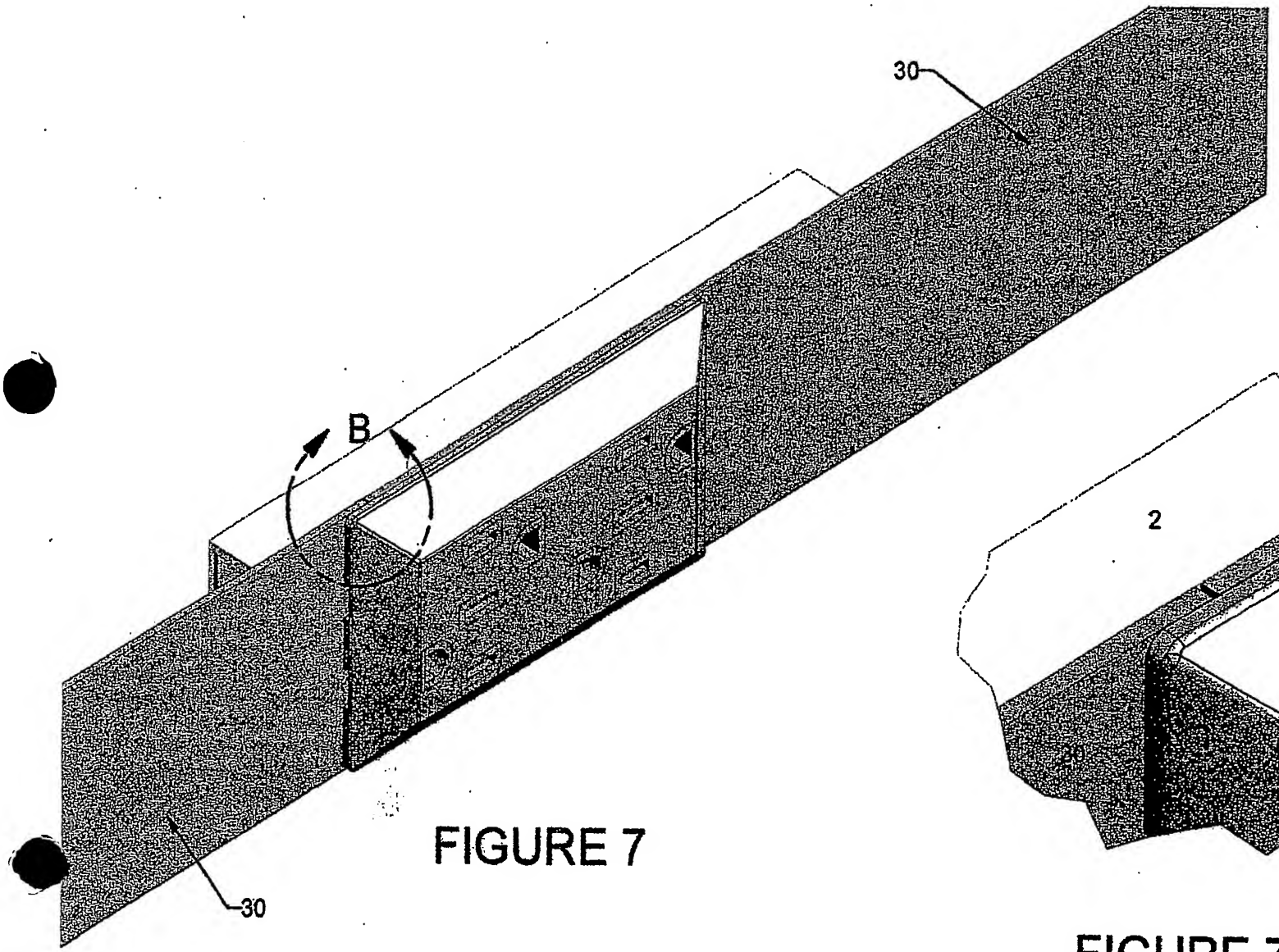

FIGURE 7

FIGURE 7A

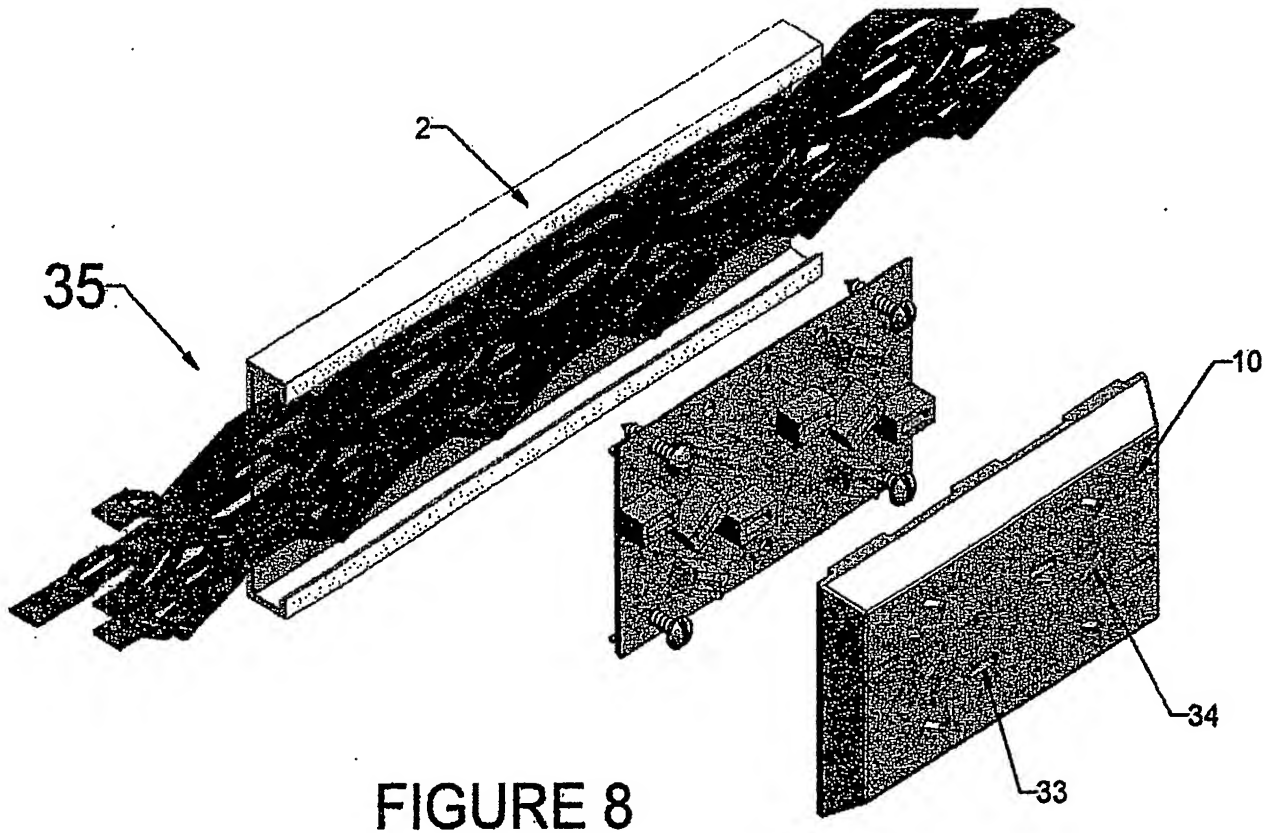

FIGURE 8

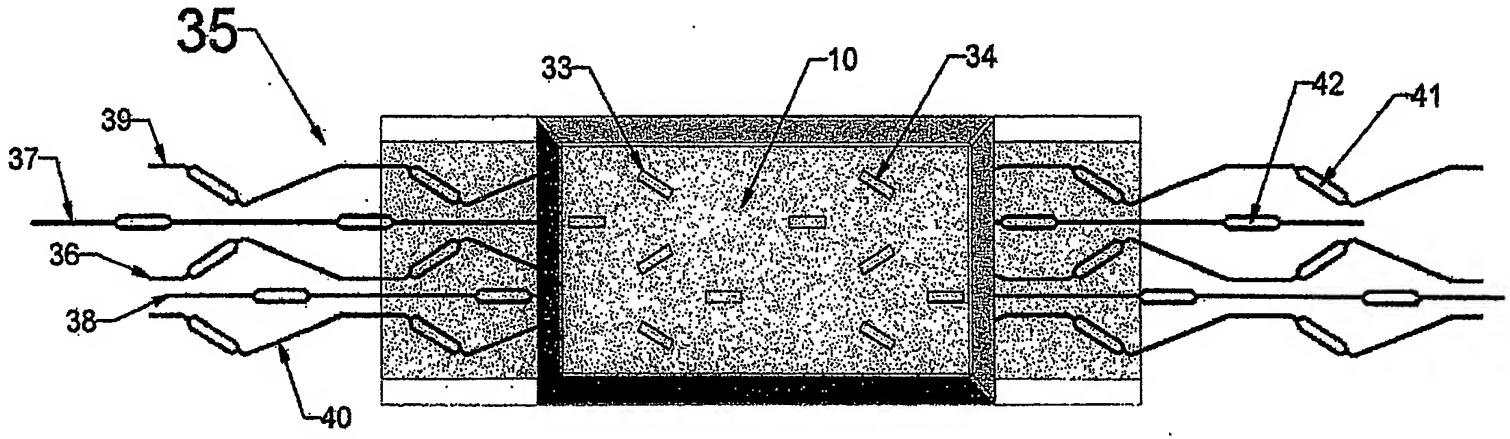

FIGURE 9

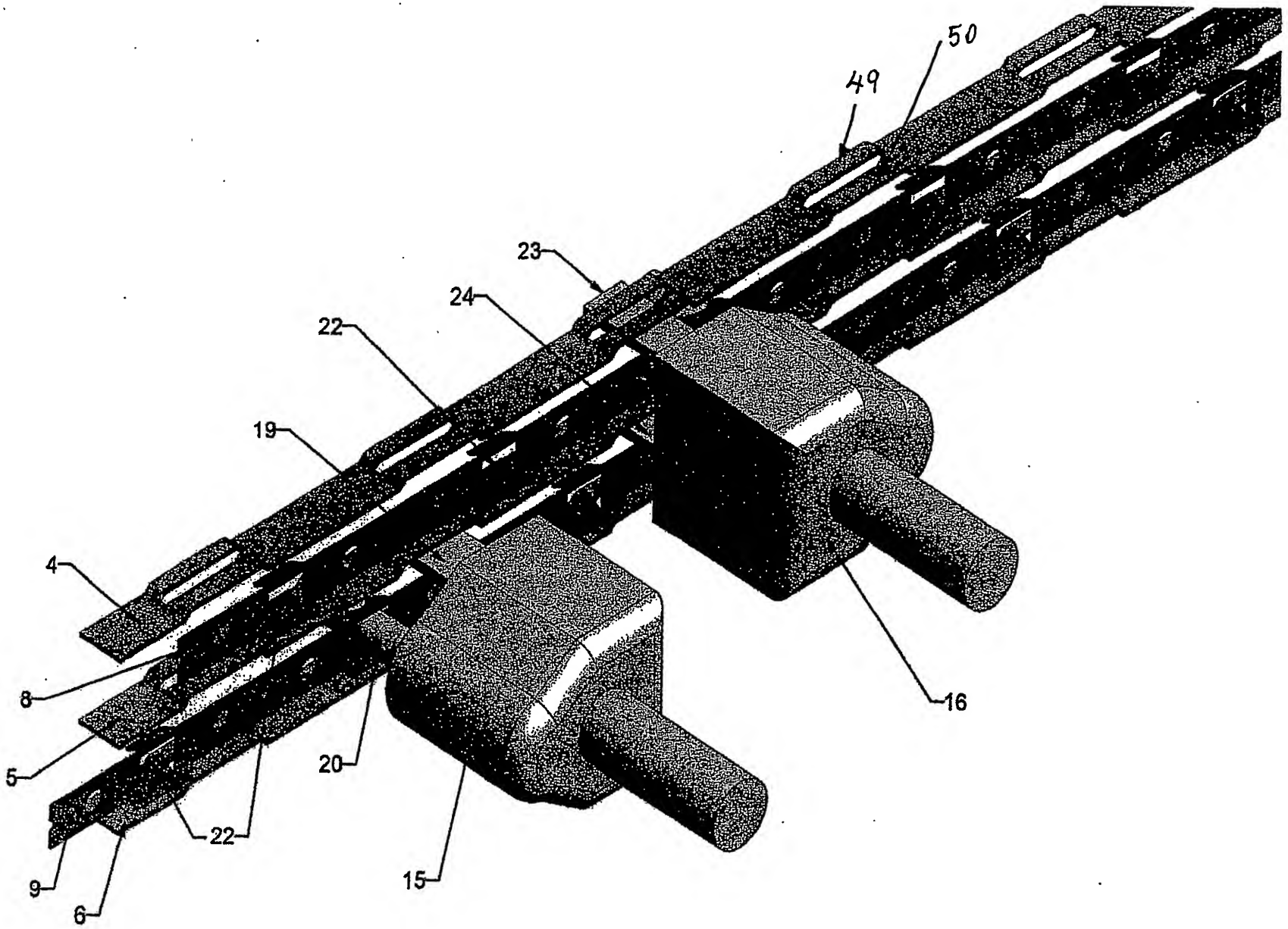

FIGURE 10